

## The atom mastery answers

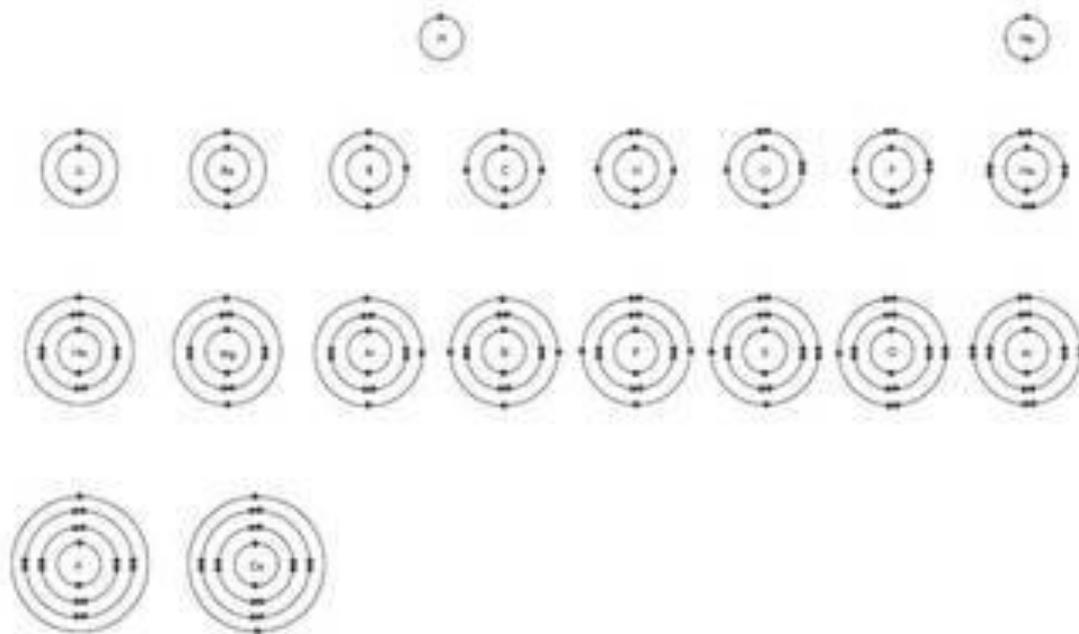
1. Charge, positive, negative, neutral, positive, negative, positive, neutral, charge, atom, model
- 2.
3. Experimental evidence
4. D has no smaller parts, PP has (protons, neutrons, electrons)  
D has no charge, PP has charged particles
5. PP: spread out positive charge, N: concentrated in nucleus  
PP electrons studded in, N: electrons orbit nucleus  
PP no protons or neutrons, N: protons and neutrons
- 6.
7. Ball of spread out positive charge, negative electrons studded in
8. Alpha particles fired at a one atom thick piece of gold. Atoms expected to pass straight through but were deflected and bounced back.
9. That the atoms must have their positive charge concentrated in a nucleus, not spread out like in the plum pudding model
- 10.
11. Proton
12. Empty space
13. -1
14. The nucleus does not have electrons
15. Nucleus with protons and neutrons
16. +1
17. Experimental evidence
18. Atom, protons, neutrons, electrons, substance, element, periodic table, elements, sodium
19. Worked example
20. 9
21. PP: spread out positive charge, N: concentrated in nucleus  
PP electrons studded in, N: electrons orbit nucleus  
PP no protons or neutrons, N: protons and neutrons
22. 12
23. 22
24. 42
- 25.
26. 6
27. Same as the atomic number
28. 20.19
29. 6.92
30. 55.91
31. 28.11
32.
  - a. 200.64
  - b. It has been rounded up
33.
  - a. 26
  - b. 42
  - c. 43
  - d. 78
  - e. 19
  - f. 17

- g. 2
- h. 54

34. In shells orbiting the nucleus

35. PP: studded in, NM: orbiting in shells

Complete the 'billiard-ball' diagrams of the atomic structures of the first 20 elements.



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## Elements, compounds and structure

38. Compound

39. Element

40. Element has same atoms, compound same

41. Chemical bonds, number of atoms

42. Protons, neutrons, electrons

43. See page 1

44. Experimental evidence

45. Atoms of the same element with different numbers of neutrons

46.

- a. False
- b. True
- c. True
- d. False
- e. False

47. B

48.

- f. Don't have to be different
- g.
- h. Can be an element
- i. Doesn't have to be same type

j. Needs a chemical bond

49. 2,8,1 and 2,7

50. By bonding atoms of fluorine

51. Compound

52. Contains different elements chemically bonded

53. Molecular substances, molecules, chemically bonded, chemical formula

54. Two hydrogen atoms, two oxygen atoms, two nitrogen atoms, two hydrogen and one oxygen atom, four hydrogen and one carbon atoms, two oxygen and one carbon

55. Hydrogen, oxygen, nitrogen elements, water, methane and carbon dioxide compounds

56. Methane, water, hydrogen, oxygen, carbon dioxide

57. 10

58. 20

59. 6

60. 1,1,0

61.

62. Giant substances, atoms, chemically bonded, giant substances, elements, compounds

63. Left is element, right is compound

64. Left has only one type of atom, right has two types of atom

65. Because they have hundreds of atoms bonded together

66. Fe

67. P: 26, E: 26, N: 30

68. 47.32

69.

Atoms are made of	How many atoms are in that substance and what those atoms are
Atoms can be joined together by	Molecular substance
When a small group of atoms are joined together we call this a	Elements or compounds
A substance made of lots of molecules is a	Giant substance
A substance made of billions of atoms all joined together is a	Molecule
Molecular and giant substances can be	Chemical bonds
The chemical formula of a substance tells you	Protons neutrons and electrons

70. Nitrogen + hydrogen → ammonia

71. Nitrogen and hydrogen

72. Ammonia

73. Ethanol + oxygen → carbon dioxide + water

74. Ethanol, oxygen; reactants. Carbon dioxide, water; products.

75. It is made of one type of atom

76. It is made of billions of molecules which do not have chemical bonds between them

77. 8,8,8

78.

a. Done

b. One calcium two bromine

c. 3 magnesium 2 nitrogen

d. 6 carbon, 12 hydrogen, 6 oxygen

e. 1 carbon, 2 oxygen

f. 7 carbon, 5 hydrogen, 3 nitrogen, 6 oxygen

79.

- a. 1 calcium, 2 oxygen, 2 hydrogen
- b. 2 lithium, 1 sulphur, 4 oxygen
- c. 2 aluminium, 3 sulphur, 12 oxygen
- d. 1 calcium, 1 carbon, 3 oxygen
- e. 1 magnesium, 2 nitrogen, 6 oxygen
- f. 1 gallium, 2 nitrogen, 6 oxygen

80. P and Q

81. R

82. P and Q reactants, R product

83. The atoms have rearranged into a new substance

84. 3

85. 6

86. 3

87. 6

88. As no atoms have been created or destroyed, just rearranged

89.  $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$

90.  $2\text{Li} + \text{F}_2 \rightarrow 2\text{LiF}$

91.  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

92.  $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$

93.  $\text{P}_4 + 5\text{O}_2 \rightarrow 2\text{P}_2\text{O}_5$

94.  $4\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{Al}_2\text{Cl}_3$

95.  $\text{S} + 3\text{F}_2 \rightarrow \text{SF}_6$

96.  $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$

97.  $\text{S}_8 + 12\text{O}_2 \rightarrow 8\text{SO}_3$

98.  $\text{MgCO}_3 + \text{Ca} \rightarrow \text{CaCO}_3 + \text{Mg}$

99.  $\text{Li}_2\text{SO}_4 + 2\text{K} \rightarrow \text{K}_2\text{SO}_4 + 2\text{Li}$

100.  $\text{Mg}(\text{OH})_2 + 2\text{K} \rightarrow 2\text{KOH} + \text{Mg}$

101.  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

102. Copper sulphate + sodium hydroxide  $\rightarrow$  copper hydroxide + sodium sulphate

103. Copper sulphate + sodium hydroxide reactants, copper hydroxide + sodium sulphate products

104. 1 copper, 1 sulphur, 4 oxygen

105. Atoms of different elements chemically bonded

106.  $\text{CuSO}_4 + 2\text{NaOH} \rightarrow \text{Cu}(\text{OH})_2 + \text{Na}_2\text{SO}_4$

107. 1 calcium, 1 carbon, 3 oxygen

108. Compound, atoms of different elements chemically bonded

109. Giant

110.  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

111. Billions of atoms all chemically bonded together

112. Magnesium + oxygen (reactants)  $\rightarrow$  magnesium oxide (product)

113.  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

114. As above

115.

- a. White circles ( $\text{O}_2$ ) and grey circles (Mg)
- b. Grey circles with white circles stuck on
- c. Oxygen, magnesium elements, magnesium oxide, compound
- d. Same number on both sides
- e. Atoms of oxygen are now being weighed as they are bonded to the magnesium. They were not included as part of the original mass as they were in the air